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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/697,618 | 10/29/2003 | James O'Neil | 200312535-1 | 7287 |
| 22879 7590 05/18/2007 HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400 | | | EXAMINER MCDONALD, RODNEY GLENN | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/697,618

Applicant(s)

O'NEIL ET AL.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 and 67-86 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-14 and 67-86 is/are allowed.
- 6) ☒ Claim(s) 1-11, 15-26 and 30-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32, 34, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. (U.S. Pat. 5,395,704) in view of Montcalm et al. (U.S. Pat. 6,668,207).

Regarding claim 1, Barnett et al. teach a method of forming a thin film fuel cell electrode. (See Abstract) Barnett et al. teach providing a substrate and at least one deposition device. (Column 3 lines 56-68; Column 4 lines 1-38) A film is deposited that has a porous property since the films deposited have densities of from 75% to >85%.

(Column 4 lines 62-65) The position of the substrate can be varied by rotating the substrate with respect to the targets. (Column 4 lines 29-33)

Regarding claim 15, Barnett et al. teach providing at least first and second deposition devices. (Column 3 lines 56-68; Column 4 lines 1-38)

Regarding claim 31, Barnett et al. teach utilizing second and third deposition devices. (Column 3 lines 56-68; Column 4 lines 1-38)

Regarding claim 34, the electrode comprises an anode. (Column 5 lines 37-57)

Regarding claim 35, the anode can be Ni-YSZ. (Column 5 lines 50-53)

Regarding claim 36, the electrode comprises a cathode. (Column 5 lines 37-57)

The differences between Barnett et al. and the present claims is that the deposition characteristic profile for the film is not discussed (Claim 1), varying the relative position of the substrate with respect to at least one axis in order to achieve the deposition characteristic profile is not discussed (Claim 1), the varying of the power is not discussed (Claims 2, 16), advancing the substrate along a substrate advancement path is not discussed (Claims 5, 20), varying the speed of the substrate is not discussed (Claims 6, 21, 32) and traversing the substrate back and forth is not discussed (Claims 9, 24).

Regarding the deposition characteristic profile for the film and varying the relative position of the substrate with respect to at least one axis in order to achieve the deposition characteristic profile (Claim 1), Montcalm teach a method for achieving a selected thickness profile and varying the relative position of the substrate to at least one axis in order to achieve a deposition characteristic profile by controlling the velocity

and spinning the substrate as the substrate sweeps across the source. (See Abstract; Column 7 lines 8-15; Column 7 lines 46-51)

Regarding claim 2, 16, Montcalm teach controlling the power to control the desired thickness profile. (Column 7 lines 8-15)

Regarding claims 5, 20, Montcalm teach advancing the substrate along a substrate advancement path. (Column 7 lines 37-45)

Regarding claims 6, 21, 32, Montcalm teach that the speed of the substrate can be varied to control the thickness profile. (Column 7 lines 8-15)

Regarding claims 9, 24, Montcalm teach that the substrate can be traversed back and forth. (Column 7 lines 37-39)

The motivation for utilizing the features of Montcalm is that it allows for producing highly uniform films. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Barnett et al. by utilizing the features of Montcalm et al. because it allows for producing uniform films.

Claims 3 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. in view of Montcalm et al. as applied to claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32, 34, 35 and 36 above, and further in view of Tsai et al. "Bias sputtered deposition of dense Ytria-Stabilized Zirconia Films on Porous Substrates", J. Electrochem. Soc., Vol. 142, No. 9, September 1995 pp. 3084-3087.

The difference not yet discussed is the varying of the bias to the substrate. (Claims 3, 17)

Regarding claims 3 and 17, Tsai et al. teach controlling the bias of the substrate during deposition in order to control the structure of the film. (See Abstract; Page 3085)

The motivation for utilizing the features of Tsai et al. is that it allows for controlling the structure of the film. (Page 3085)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Tsai et al. because it allows for controlling the structure of the film.

Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. in view of Montcalm et al. as applied to claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32, 34, 35 and 36 above, and further in view of Ueda (Japan 63-195263).

The difference not yet discussed is the varying of the magnetic field. (Claims 4, 19)

Regarding claims 4, 19, Ueda teach utilizing a varying magnetic flux density during deposition to obtain a homogenous thin film. (See Abstract)

The motivation for utilizing the features of Ueda is that it allows for achieving a homogenous thin film. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Ueda because it allows for achieving a homogenous thin film.

Claims 7, 8, 10, 11, 18, 22, 25, 26, 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. in view of Montcalm et al. as

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applied to claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32, 34, 35 and 36 above, and further in view of Kobayashi (Japan 05-021347).

The difference not yet discussed is the varying of the distance (Claims 7, 18, 22, 30), the varying of the speed (Claim 8), varying the distance in multiple directions is not discussed (Claims 10, 25), varying the speed is not discussed (Claims 11, 26) and varying the substrate advancement path is not discussed (Claim 33).

Regarding claims 7, 18, 22, 30, Kobayashi et al. teach varying the distance between the deposition source and the substrate so that the composition of the film can be the same as when the film was first deposited. (See Abstract)

Regarding claim 8, Montcalm already discussed above teach varying the speed of the substrate for depositing a uniform film. (See Montcalm discussed above)

Regarding claims 10, 25, since Montcalm teach rotating the substrate and Kobayashi teach changing the distance between substrate and deposition source the distance is varied in multiple directions between the substrate and the deposition. (i.e. in the horizontal and vertical directions.) (See Montcalm and Kobayashi discussed above)

Regarding claims 11, 26, Montcalm is discussed above and teach varying the speed of the substrate. (See Montcalm discussed above)

Regarding claim 33, since Montcalm teach rotating the substrate and Kobayashi teach changing the distance between substrate and deposition source the substrate advancement path is varied. (See Montcalm and Kobayashi discussed above)

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The motivation for utilizing the features of Kobayashi is that it allows for controlling the composition of the film. (See Kobayashi et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Kobayashi et al. because it allows for controlling the composition of the film.

Claims 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. in view of Montcalm et al. and further in view of Kobayashi et al. as applied to claims 1, 2, 5, 6, 7, 8, 9, 10, 11, 15, 16, 18, 20, 21, 22, 24, 26, 30, 31, 32, 33, 34, 35 and 36 above, and further in view of Wang et al. (U.S. Pat. 6,364,956).

The difference not yet discussed is the use of a shutter (Claim 23).

Regarding claim 23, Wang teach utilizing a shutter to selectively block at least a portion of the a material expelled from at least on of the deposition devices. (See Abstract)

The motivation for utilizing the features of Wang is that it allows for production of a gradient film. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shutter as taught by Wang because it allows for producing gradient films.

Claim 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnett et al. in view of Montcalm et al. as applied to claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32, 34, 35 and 36 above, and further in view of Surampudi et al. (U.S. Pat. 5,773,162).

The difference not yet discussed is the material of the cathode. (Claim 37)

Regarding claim 37, Surampudi et al. teach that the material for the cathode material of a fuel cell can be sputtered platinum, (Column 12 lines 63-68)

The motivation for utilizing the features of Surampudi et al. is that it allows production of a fuel cell. (Column 12 lines 63-68)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Surampudi et al. because it allows for production of fuel cell.

Allowable Subject Matter

Claims 27-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 12-14 and 67-86 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 12-14 and 67-74 are allowable over the prior art of record because the prior art of record does not teach the claimed method including where the deposition characteristic comprises at least a composition gradient profile and at least one morphological gradient profile.

Claims 27-29 are indicated as being allowable over the prior art of record because the prior art of record does not teach including the claimed method including where the deposition characteristic comprises at least composition gradient profile and at least one morphological gradient profile.

Claims 75-86 are allowable over the prior art of record because the prior art of record does not teach the claimed method including developing a deposition profile for a film, wherein the profile includes a film porosity modulation based on predetermined desired electrode properties; and forming the film in accordance with the deposition profile by depositing material from the deposition device in accordance with the deposition profile.

The closest prior art of record does not teach depositing an electrode for a thin film fuel cell by depositing according to a deposition profile characteristic where the deposition characteristic comprises at least a composition gradient profile and at least one morphological gradient profile or a film porosity modulation characteristic.

Response to Arguments

Applicant's arguments filed March 5, 2007 have been fully considered but they are not persuasive.

In response to the argument that the prior art does not teach developing a deposition characteristic profile having at least one porous layer, it is argued that Barnett et al. suggest depositing a porous layer. Barnett et al.'s layer can have a density of 75% or a porosity of 25%. The pending claims do not provide the metes and the bounds for the porosity and thus Barnett et al.'s layer is suggestive of the claimed porous layer. Even when considering Applicant's specification for guidance the range of porosity is about 25% or greater. Clearly Barnett et al.'s porosity of 25% meets the endpoint set forth in Applicant's specification of "about" 25% porosity. Regarding the deposition characteristic profile, Montclam suggest a deposition characteristic profile in

the form of a deposited thickness profile by controlling the velocity and spinning of the substrate as the substrate sweeps across the source. Combining the features of Montcalm with Barnett results in production of a highly uniform film. (See Barnett et al. discussed above)

In response to the argument that the prior art does not teach developing a deposition characteristic profile based on predetermined desired electrode properties, it is argued that Barnett et al. teach depositing electrodes and that the second reference of Montcalm teach a deposition characteristic profile in the form of a deposited thickness profile which is based on the film property of achieving a uniform thickness. Combining the features of Montcalm with Barnett will result in a film thickness profile (i.e. a deposition characteristic profile) the is based on a uniform film thickness property (i.e. a desired electrode property). It should be noted that Applicant has argued the importance of control of the film composition, porosity/density and modulation of the porosity through out the electrode and such claims have been indicated as allowable. (See Montcalm and Barnett discussed above)

In response to the argument that Ueda teach away from forming a porous film but a homogenous film, it is argued that a porous film can be homogenous in that its composition or structure can be uniform throughout. (See Ueda discussed above)

In response to the argument that Kobayashi does not teach varying a speed at which the substrate passes the deposition device, it is argued that Montcalm suggest varying the speed to control the film thickness profile and thus the film uniformity. (See Montcalm discussed above)

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-TH with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
May 16, 2007